Soc Psychiatry Psychiatr Epidemiol (2006) xx:1–6 DOI 10.1007/s00127-006-0060-4

ORIGINAL PAPER

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# Childhood victimisation and developmental expression of non-clinical delusional ideation and hallucinatory experiences

## Victimisation and non-clinical Psychotic experiences

Accepted: 1 March 2006 / Published online: 29 March 2006

**Abstract** *Background* Victimisation in childhood may be associated with adult psychosis. The current study examined this association in the crucial developmental period of early adolescence and investigated whether (1) unwanted sexual experiences, and (2) being bullied, were associated with non-clinical delusional ideation and hallucinatory experiences in a general population sample of 14 year olds. *Methods* Data were derived from standard health screenings of the Youth Health Care Divisions of the Municipal Health Services in Maastricht, the Netherlands. A self-report questionnaire was filled out by a total of 1290 adolescents to assess non-clinical psychotic experiences, as well as experiences of being bullied and sexual trauma. *Results* Non-clinical psychotic experiences were strongly and independently associated with both bullying (OR=2.9, 95% CI 1.8–4.8) and sexual trauma (OR=4.8, 95% CI 2.3–10.1). *Conclusions* The results suggest that reported associations between childhood victimisation and adult psychosis can be understood in a developmental framework of onset of at-risk mental states in early adolescence. In addition, the data suggest that the traumatic experience of being bullied may also feed the cognitive and biological mechanisms underlying formation of psychotic ideation.

**Key words** bullying – sexual trauma – victimisation – psychosis – adolescents

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## Introduction

Several studies have demonstrated, with one recent exception [1], an association between sexual and psychological trauma in childhood and outcomes of psychotic disorder and psychotic symptoms in adulthood [2–8, 51]. In addition, it has been suggested that in the general population, childhood trauma is similarly associated with the broader, non-clinical psychosis outcome of psychotic experiences [4, 9, 10].

Less well recognised but arguably equally traumatic, is repeated exposure to bullying in childhood. Several studies have shown that being a victim of bullying is associated with mental (depression, fear, attention deficit disorder, conduct disorder and hyperactivity) and behavioural (aggression in particular) problems [11–13]. Less is known, however, about the impact on clinical and non-clinical psychosis outcomes.

It has been argued that the link between childhood exposure to victimisation and adult psychosis outcomes is mediated by the formation of cognitive mechanisms facilitating psychotic ideation [14–17, 52], which in turn may predict the onset of psychotic disorder in adulthood [18, 19]. As the first expression of psychosis rises dramatically after puberty [20], one would expect the association between childhood victimisation and expression of psychosis to first become apparent in the form of non-clinical psychotic experiences during the crucial developmental period of early adolescence. The validity of this supposition comes from work demonstrating that a relatively high prevalence of non-clinical psychotic experiences can be measured in early adolescence [19, 21–24], and from work indicating that psychotic experiences in early adolescence increase the risk for adult transition to psychotic disorder [19, 23].

The present study aimed to investigate the association between victimisation and non-clinical delusional ideation and hallucinatory experiences in a general population sample of adolescents aged 14 years. It was hypothesised that being the victim of (1) unwanted sexual experiences, and (2) bullying, would be associated positively and independently with non-clinical delusional ideation and hallucinatory experiences (hereafter called non-clinical psychotic experiences).

## Method

### Subjects

All children in the Netherlands aged 4–18 years are examined regularly by the Youth Health Care Divisions (YHCD) of the Municipal Health Services. Data were derived from these standard health screenings of the YHCD of Maastricht and surrounding areas (total population of 201,000), enriched with specific questionnaires in the context of an academic partnership between YHCD and Maastricht University [25, 26]. The first wave of these Regional Profiles of Youth health (RPY) data in all adolescents attending second grade of secondary school (age 13/14 years) was used for the current analysis. Health information collected in these secondary school students included a self-report questionnaire, primarily designed to detect physical or mental problems. This questionnaire was administered by a nurse during the health screening.

### Assessments

#### All variables were derived from the RPY data

*Non-clinical psychotic experiences* were assessed with four questions rated as yes or no: (1) "Some people believe in mind reading or being psychic. Have other people ever read your mind?" (2) "Have you ever had messages sent just to you through television or radio?" (3) "Have you ever thought that people are following you or spying on you?" and (4) "Have you ever heard voices other people cannot hear?". These questions were derived from the Diagnostic Interview Schedule for Children (DISC-C) [27] for DSM-III [28], and were used previously by Poulton et al. [19], showing their high predictive validity in relation to adult psychotic disorder. The answers to the questions about delusional ideation and hallucinatory experiences were combined into one psychosis-measure with a value of 1 indicating that at least one symptom was present (e.g. a positive answer to one of the questions) and a value of 0 indicating the absence of non-clinical psychotic experiences (e.g. a negative answer to all of the questions). The question about reading thoughts was not included in the psychosis-measure in the current paper. Thirty-six percent of all subjects answered yes to this question, which is much higher than would be expected on the basis of other studies [29, 30]. This question therefore lacks discriminative power in this age group and was excluded from the analysis.

*Bullying* was assessed with the question: "How many times have you been the victim of bullying in the past year?". The question was rated on a 5-point scale (1=never, 2=one or two times, 3=one or two times per month on average, 4=ones per week on average, 5=several times per week). Guided by previous research, bullying was rated as present when a subject reported incidents of bullying occurring once a week or more (scores 4 or 5) [4].

*Sexual trauma* was assessed with the question "Have you ever had an unpleasant sexual experience?". Sexual trauma was rated as yes or no (1=yes, 0=no).

*A priori confounders* included in the statistical models were age, sex and socio-economic status (SES). The latter variable was included as previous research has found an association between SES on the one hand and psychosis [31, 32] and childhood trauma [33, 34] on the other. Socio-economic status was estimated based on house price in the street where each subject was living at the moment of the assessment. The estimated SES was a continuous variable (range $77,000–$766,582) [35]. As no SES data were available for streets with rented houses only, analyses for SES applied to a sub sample only.

### Statistical analyses

Data were analysed with the LOGISTIC module in STATA [36]. In order to test the hypothesis that victimisation was associated with non-clinical psychotic experiences in young adolescents, two logistic regression analyses adjusted as described above were carried out with the psychosis outcome as dependent variable and 'being bullied' and 'sexual trauma' as independent variables in two separate models. In addition, the two victimisation variables were entered jointly into one model in order to assess the relative independence of their associations.

Dose–response relationships were assessed by dividing the psychosis outcome into three groups (no psychotic experience, 1 psychotic experience, 2 or more psychotic experiences). In addition, in order to test for dose–response between 'being bullied' and psychotic experiences, the severity of being bullied was coded '0' (never), '1' (one or two times in the past year) and '2' (two times per month or more).

## Results

### Subjects and descriptive statistics

The total sample consisted of 1290 subjects (634 male and 656 female subjects). The mean age was 14 years (SD=1, range 12.4–16.8). A total of 74 subjects (5.8%) reported 'being bullied' and 30 subjects (2.4%) reported 'sexual trauma'. The association between the two independent variables was not strong (OR=2.6, $P$=0.08). In the total sample, 244 subjects (19.1%) met the criteria for the psychosis outcome as described above. A total of 60 subjects (4.7%) endorsed the

**Table 1** Odds ratios for 'being bullied' showing a dose–response relationship with psychotic experiences in young adolescents

| 'Being bullied' | Psychosis outcome measure | | | | | |
|---|---|---|---|---|---|---|
| | No | | Yes | | OR (95% CI)[a] | |
| | *n* | % | *n* | % | | |
| 0 | 765 | 74.7 | 137 | 56.1 | 1 | |
| 1 | 193 | 18.8 | 66 | 27.0 | 1.91 (1.4–2.7) | *P*=0.00 |
| 2 | 66 | 6.4 | 41 | 16.8 | 3.47 (2.2–5.4) | *P*=0.00 |
| Test for trend | $\chi^2$=40.9 | | df=1 | | *P*=0.000 | |

[a] Unadjusted OR

question about receiving messages, 165 (12.7%) subjects reported being spied upon and 90 (7.0%) subjects answered 'yes' to the question about hearing voices.

## Is victimisation associated with non-clinical psychotic experiences?

The risk of non-clinical psychotic experiences in adolescents exposed to bullying was 40.5% (*n*=30) compared to 17.9% (*n*=214) in the non-exposed (unadjusted OR=3.1, 95% CI 1.9–5.1). For 'sexual trauma', the risk of non-clinical psychotic experiences was 53.3% (*n*=16) in the exposed compared with 17.4% (*n*=226) in the non-exposed (unadjusted OR=5.1, 95% CI 2.5–10.6). After controlling for age and gender, the effect of the two independent variables on the psychosis outcome did not change substantially ('being bullied': OR=2.9, 95% CI 1.8–4.9; 'sexual trauma': OR=3.8, 95% CI 1.8–8.0). Including SES in the list of confounders revealed similar results ('being bullied': OR=3.4, 95% CI 1.7–6.8; 'sexual trauma': OR=4.5, 95% CI 1.5–13.3).

The logistic regression analysis with the two independent variables entered together suggested independence of the exposures in their association with the psychosis outcome (bullying: unadjusted OR=2.9, 95% CI 1.8–4.8; sexual trauma: unadjusted OR=4.8, 95% CI 2.3–10.1). Controlling for confounders did not change these results.

There was a significant dose–response relationship between frequency of being a victim of bullying and the psychosis outcome, regardless of confounders. Thus, the risk of developing non-clinical psychotic experiences increased with increased frequency of being a victim of bullying (Table 1).

The analysis of severity of non-clinical psychotic experiences revealed a significant dose–response relationship between severity of non-clinical psychotic experiences and both exposures, regardless of confounders, indicating stronger associations with the more severe psychotic experiences (Tables 2 and 3).

**Table 2** Odds ratios for 'psychotic experiences' showing a dose–response relationship with 'being bullied' in young adolescents

| Psychotic experiences | 'Being bullied' | | | | | |
|---|---|---|---|---|---|---|
| | No | | Yes | | OR (95% CI)[a] | |
| | *n* | % | *n* | % | | |
| 0 | 980 | 82.1 | 44 | 60.3 | 1 | |
| 1 | 162 | 13.6 | 18 | 24.7 | 2.47 (1.4–4.4) | *P*=0.00 |
| 2 | 52 | 4.4 | 11 | 15.1 | 4.71 (2.3–9.7) | *P*=0.00 |
| Test for trend | $\chi^2$=25.7 | | df=1 | | *P*=0.000 | |

[a] Unadjusted OR

**Table 3** Odds ratios for 'psychotic experiences' showing a dose-response relationship with 'sexual trauma' in young adolescents

| Psychotic experiences | Sexual trauma | | | | | |
|---|---|---|---|---|---|---|
| | No | | Yes | | OR (95% CI)[a] | |
| | *n* | % | *n* | % | | |
| 0 | 1012 | 81.8 | 14 | 46.7 | 1 | |
| 1 | 169 | 13.7 | 11 | 36.7 | 4.70 (2.1–10.6) | *P*=0.00 |
| 2 | 56 | 4.5 | 5 | 16.7 | 6.45 (2.2–18.7) | *P*=0.00 |
| Test for trend | $\chi^2$=23.6 | | df=1 | | *P*=0.000 | |

[a] Unadjusted OR

## Discussion

### Findings

A strong dose–response association was found between victimising experiences and non-clinical psychotic experiences in young adolescents.

The current results are in line with several studies reporting an association between sexual trauma during childhood and psychotic experiences in adults [2, 4–8]. The current study suggests that the ontogenesis of this association can be traced back to the crucial developmental period of early adolescence, when the expression of psychosis becomes widespread. The results of the present study conflict with the findings of Spataro et al. [1], who found no association between childhood sexual trauma and schizophrenia. Spataro et al. [1], however, conducted a prospective study, meaning that all exposed children in the study were in contact with child welfare and protection services. This might be an essential element diminishing the risk for the development of psychotic disorders in adulthood [37]. Additionally, the current study found that other traumatic experiences, such as being the victim of bullying, have a substantial influence on the development of non-clinical psychotic experiences in young adolescents. This fits with existing evidence on multiple other forms of victimisation (e.g. emotional, physical and psychological trauma) that have been found to be associated with psychosis later in life [4–7, 17]. Based on these results, it is attractive to speculate that victimisation in childhood is associated with the development of non-clinical psychotic experiences in early adolescence, which in turn may shape risk for psychotic disorder later in life.

### Dose response association

In the present study, the report of being a victim of bullying was associated with non-clinical psychotic experiences in early adolescence in a dose–response fashion. Similarly, a dose–response relation was found between non-clinical psychotic experiences on the one hand and being a victim of bullying and sexual trauma on the other. Dose–response is suggestive of causality [38] and the findings concur with previous reports indicating that trauma and psychosis are associated particularly at the more severe end of the psychosis spectrum [4, 51].

### Reverse causality

Since the current results are based on a cross-sectional study, the possibility of reverse causality cannot be excluded. This seems particularly relevant for the bullying exposure. Being different from peers increases the risk of bullying; children with subtle expression of social deviance or unusual ideas due to psychosis liability [39] may thus become the victim of bullying rather than the other way round. While such a mechanism of person–environment correlation [40] cannot be excluded, it is unlikely to be the sole explanation, in particular since other forms of childhood trauma (such as sexual trauma), which less likely result from person–environment correlations, also increase the risk for non-clinical psychosis.

### Biological and psychological mechanisms

There are plausible cognitive and biological models to account for the association between childhood trauma and the development of psychosis. According to a recent cognitive model of psychosis, adverse experiences in childhood can induce a cognitive liability for psychosis [15]. It is suggested that childhood trauma can lead to the development of negative schemas of the self and the world (e.g., beliefs about the self as vulnerable to threat, or about others as dangerous) that facilitate external attributions, which may lead to the development of paranoid delusions [41]. Similarly, Birchwood et al. [14] have emphasised that childhood experience of social adversity leads to the development of negative schemas involving social humiliation and subordination, which in turn may fuel voices and paranoia [16].

Recent biological models have suggested that childhood trauma might lead to enduring and long-lasting changes in the brain. Read et al. [17] suggested that adverse life events, if they occur early enough or are sufficiently severe, actually mould the neurodevelopmental abnormalities that underlie the heightened sensitivity to stressors, which is typically seen in adults diagnosed with schizophrenia. Walker and DiForio [42] suggested that exposure to persistent stressors resulting in a chronic heightened glucocorticoid release, may cause permanent changes to the HPA-axis. Stress-induced dysregulation of the HPA-axis may subsequently give rise to increased dopamine (DA) receptor densities and DA release [42], suggesting that abnormality in the functioning of the HPA-axis may underlie the dopaminergic abnormalities that are generally thought to be involved in psychosis [42, 43]. Several recent studies have suggested that the sensitisation of the DA system might mediate the expression of psychosis [44–46]. Kapur [44] suggested that a dysregulated, hyperdopaminergic state may lead to stimulus-independent release of DA, which may take over the normal process of contextually driven salience attribution and leads to aberrant assignment of salience to external objects and internal representations. A recent study extended these findings to subjects at risk for psychosis and demonstrated that a hyperreactive DA system might directly influence

the intensity of psychotic experiences in response to stress in daily life [47, 48].

## Limitations

The results of the present study should be viewed in light of several methodological issues. First, data were derived from standard health screenings including numerous questions over a wide range of physical and mental health problems. Consequently, the assessment of certain items was limited. E.g. the assessment of sexual trauma was lacking detail with regard to frequency and qualitative aspects of the trauma. Furthermore, non-clinical psychotic experiences were assessed with only four questions, without further detail with regard to frequency of the experience or degree of conviction. Endorsement of one of these items could, therefore, occasionally result from this being a true event or it could have happened only once. On the other hand, Poulton et al. [19] used the same items and showed in a longitudinal study that they had a high predictive value for the later development of psychosis. In addition, 19.1% of all subjects met criteria for non-clinical psychotic experiences, which is in accordance with findings from other studies using more extensive psychosis assessments [29, 30].

Second, at the time they were filling out the questionnaire, subjects were aware of the fact that possible problems would be discussed with a nurse during the health screening. It can be argued that subjects therefore might have underreported sexual trauma, bullying and psychotic experiences. As stated before, this seems unlikely for the psychotic experiences since percentages found in the current study are in accordance with earlier findings [29, 30]. However, only 5.8% of all subjects reported bullying and 2.4% reported sexual trauma, which is much lower than percentages found in other studies [3, 12, 13]. This could have led to a reduction of statistical power, suggesting that the association between victimisation and psychosis might even be stronger than reported in the present study.

Third, victimisation was assessed on the basis of self-report. It could be argued that psychosis is associated with proneness to disclose trauma. However, it has been found that incorrect reporting of sexual trauma is no different for schizophrenia than for the general population [49]. Additionally, it has been found that psychosis most likely results in under-reporting rather than over-reporting of victimisation [5, 50].

Finally, the electronic registration of youth health in the RPY data set has started only recently. Therefore, the present results are based on cross-sectional data. Future research can be performed using longitudinal data, so that a time axis can facilitate causal interference.

**Acknowledgements** Dr. Inez Myin-Germeys was supported by NARSAD (Young Investigator Award), by the Dutch Medical Council (VENI-GRANT), and especially by the Essel Foundation.

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